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Design Standards

Section 10

Cleaning and Testing Sanitary Sewer

SECTION X

CLEANING AND TESTING SANITARY SEWER

10-1 GENERAL

This section specifies requirements for determining acceptability of sewer systems.

10.2 CLEANING

After the sewer lines have been laid and the trench backfilled, they shall be thoroughly cleaned and tested for leakage and alignment in the presence of the Engineer before acceptance by the Owner. Cleaning shall be done by introducing water at the upper end of the trunks and laterals and flushing to remove all foreign material. Wastewater and debris shall not be permitted to enter sewer lines in service, but shall be removed at the lowest manhole of the extension. Other methods of cleaning may be used subject to approval by the Engineer. After the lines have been thoroughly cleaned, they shall be tested between all manholes for displacement.

10-3 DISPLACEMENT TEST

The displacement test shall be conducted by the Engineer and shall consist of the following: a light will be flashed between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror. If the illuminated interior of the pipe shows broken, misaligned or displaced pipe, or other defects, the defects designated by the Engineer shall be remedied by the Contractor. After cleaning and inspection have been completed, the line shall be tested for leakage by the following method.

10-4 AIRTESTING

The reach of pipe to be tested shall be isolated by completely blocking all outlets in the section under test. Careful attention must be given to blocking all plugs. Prior to installing the lower and upper plugs, the pipe must be wetted to minimize any loss of air through the pipe wall as a result of permeability in the dry condition. One of the plugs used at the manhole must be equipped to control the air entry rate and to prevent the pressure from exceeding 5 psig. This can be done by means of a blowoff valve set to operate at 5 psig.

After the pipe has been wetted and plugs installed, the air should be allowed to slowly fill the pipe until a constant pressure of 4.0 psig is maintained for at least two minutes.

Check during this two minute stabilization period, with a soap solution, all plugs and exposed fittings. If a leak is found, bleed off the air, repair the leak and start a new two minute stabilization period, and when the temperature of the air has reached equilibrium with that of the pipe wall, bring' the air pressure to 4 psig and disconnect the air supply. The gauge is then watched until the pressure reaches 3.5 psig, at which time a stop watch is started and then stopped when the pressure reaches 2.5 psig. The time' required as shown on the watch for a loss of 1.0 psig at an average pressure of 3.0 psig is used to calculate the rate of air loss. The pipeline may be considered to have passed the air loss test successfully if the loss of air is not greater than a rate of 0.0030 cubic feet per minute per square foot of internal pipe surface. The following table shows the allowable time for the pressure to drop from 3.5 to 2.5 psig for respective pipe diameters.

Pipe Diameter	Time Mm. Sec.	Pipe Diameter	Time Mm. Sec.

6"	3	0	18"	8	30
8"	3	45	20"	9	30
10"	4	45	21"	10	0
12"	5	45	24"	11	15
14"	6	30	27"	12	45
15"	7	0	30"	14	0
16"	7	30	36"	17	0

10-5 EXFILTRATION TEST

In lew of the standard sanitary sewer air tests, the Contractor may make exfiltration tests on sewers.

The test section shall be bulkheaded and the pipe subjected to a hydrostatic pressure produced by a head of water at a depth of three feet above the invert of the sewer at the upper manhole under test. In areas where ground water exists, this head of water shall be three feet above the existing water table.

This head of water shall be maintained for a period of one hour, during which it is presumed that full absorption of the pipe body has taken place, and hereafter for a further period of one hour for the actual test leakage. During this one hour test period the measured maximum allowable rate of exfiltration for any section of sewer, including service stubs, shall be as listed below:

MAIN SEWER DIAMETER (In Inches)Gallons	MAXIMUM ALLOWABLE EXFILTRATION Per Hour Per 100 Feet
6	1.2
8	1.6
10	2.0
12	2.4
15	2.8
18	3.2
21	3.6
24 & Larger	4.0

In case measurements indicate an exfiltration greater than the maximum allowable leakage, additional measurements shall be taken and continued until all leaks are located and the necessary repairs and corrective work have reduced the leakage in the section being tested below the maximum allowable by the specifications. For purpose of the test, the line between adjoining manholes will be considered a section and will be tested as such.

The Contractor shall furnish the plugs, standpipe, and other material and labor for placing the plugs and standpipe in the sewer and shall assist the Engineer in making measurements. The Contractor shall receive no additional compensation for making the leakage tests or corrective work necessary to reduce the leakage below the maximum allowed by the specifications.

The introduction of any substance into the water used for testing with the intent of sealing such leaks as may be indicated will not be permitted. If results of either of these tests are not satisfactory, repairs or pipe replacement will be required until the Engineer is satisfied that the leakage requirements are being met. All repairs, methods and materials used must be accepted by the Engineer.

10-6 PVC DEFLECTION TEST

All PVC pipe shall be mandrelled with a rigid device to pass five percent or less deflection of the pipe. If this test is made prior to complete street surfacing or other surface restoration the maximum allowed deflection shall be two percent. These allowances shall include deformations due to all causes (wall thickness variations, shipping, production, heat, etc.) The mandrel (go/no-go) device shall be cylindrical in shape and construction with nine evenly spaced arms or prongs and dimensioned tolerance of ±0.01 inch. The contact length at the mandrel's arms shall equal or exceed

the pipe nominal diameter except that ten inches and twelve inches shall be allowed for twelve inch and fifteen inch pipe respectively.

The mahdrel shall be hand pulled by the contractor through all sewer lines. Any sections of sewer not passing the mandrel shall be uncovered and the Contractor shall re-round or replace the sewer to the satisfaction of the Engineer. The repaired sections shall be retested.

The inspection shall be conducted no earlier than thirty days after reaching final trench backfill grade and compaction.

10-7 INSPECTION AND FLUSHING

Prior to final acceptance of each section of sanitary sewer line, the contractor shall' flush a ball of full diameter of the sewer through all sewers up to eighteen inches in diameter. Larger sewers shall be cleaned by other appropriate methods. All dirt and debris shall be prevented from entering the existing sewer system by means of watertight plugs or other suitable methods.

Upon completion of the contract, the Engineer will carefully inspect all sewers and appurtenances. Any unsatisfactory work shall be removed and replaced in a proper manner. The invert of the sewer and manholes shall be left smooth, clean, and free from any obstructions throughout the entire line. Manhole rings and covers must be raised to finished grade before acceptance of the sewer.

10-8 FINAL INSPECTION

Provide the City with a video tape of the inside of the sewer line. This needs to show the date it was made and by whom, also indicate the length and location of each segment of video.

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